



Call for Pilot Projects: Asset Management, Extreme Weather, and Proxy Indicators

Introduction

The Federal Highway Administration (FHWA) announces an opportunity for State Departments of Transportation (DOTs) (including the District of Columbia DOT, and the Puerto Rico Department of Transportation and Public Works) to partner with FHWA to create case studies for integrating extreme weather and climate risk into asset management¹ practices and for developing a whole life cost management plan for assets that are subject to these risks. It is anticipated that 4 to 6 pilots will be selected and will be co-funded by the selectee and FHWA.

Selected pilot agencies will produce a report documenting the project and its results. FHWA will use the pilot project results to develop a guidebook that will assist State DOTs in integrating extreme weather and climate risks into asset management practices, including assessment of extreme weather and climate risks and life cycle planning.²

Background

Many states are working on developing their asset management plans as required by 23 USC 119; at the same time they are working to assess vulnerability to extreme weather events and climate. The goal of this effort is to help States incorporate information on vulnerability assessment and mitigation strategies into their asset management programs (including assessment of risks and life cycle planning).

Extreme weather events have become increasingly damaging and problematic to transportation systems in many locations within the United States, affecting the performance of the transportation network and impacting state budgets for repair and maintenance for transportation assets. As states build their asset management programs, it is important that extreme weather and climate risks, and appropriate mitigation strategies, are integrated into asset management practice.

The focus of this opportunity is on states that have at least begun to consider extreme weather event and climate risks. Many DOTs already have extreme weather and climate vulnerability assessment findings available to inform potential risks to transportation assets and incorporate into their asset management practices. While the focus is on asset classes instead of individual roads and bridges, it is expected that

¹ Asset management is a strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on both engineering and economic analysis based upon quality information, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the life cycle of the assets at minimum practicable cost.

² Life cycle planning is a process for estimating the cost of managing an asset class, or asset sub-group, over its whole life with consideration for minimizing costs while preserving or improving the condition of the class or sub-group.

information on the vulnerability of individual assets would be needed as part of the analysis. Other states may have limited information, in comparison, and may need to consider innovative ways to quickly identify potential risks that could inform asset management processes and plan development.

A related goal is the development of additional proxy indicators³ that can facilitate assessment of vulnerabilities and streamline development of information needed to identify risks in a manner that can be integrated into asset management practices.

Purpose

This project will assist State Departments of Transportation (DOTs) in operationalizing a risk assessment process related to extreme weather events and climate that is integrated with the work of asset managers. It will build upon the work of other related studies, including [National Cooperative Highway Research Project \(NCHRP\) 25-25 Task 94, *Integrating Extreme Weather and Adaptation into Transportation Asset Management Plans*](#) and [NCHRP 08-93, *Managing Risk Across the Enterprise: A Guidebook for State Departments of Transportation*](#).

Pilots funded under this solicitation are one part of the Asset Management, Extreme Weather, and Proxy Indicators project. FHWA intends to use mechanisms outside of this solicitation to accomplish the other deliverables. The other key elements of the project are:

- **Peer exchanges** will engage key stakeholders in the project by soliciting input, improving understanding of the type of information that transportation practitioners need, and refining research questions and methodologies.
- **Webinars among the pilot agencies** and key stakeholders that will help create a network of peers focused around their pilot projects and provide a venue for exchanging lessons learned.
- **A guidebook** to support other transportation agencies in addressing extreme weather event and climate risk in asset management, including: plan development, and the use of asset management standards of practice to optimize investment decisions. The guidebook will include experience and methods applied by the pilots, both successes and challenges, along with information gained through a literature review and other sources. The examples from the pilots, knowledge acquired, institutional issues encountered, questions raised, techniques used, and insights gained, etc. will provide helpful input into the development of the guidebook.

Each pilot project will, at a minimum:

- (1) Identify, analyze, evaluate, prioritize, and develop plans for addressing the risks associated with extreme weather and climate on classes of transportation assets; and

³ Proxy indicators provide an indication of condition, exposure to extreme weather and climate, sensitivity to extreme weather and climate, and capacity to adapt. For example, proxy indicators might include pavement distress, pier or abutment shape (which may suggest bridge sensitivity to precipitation-driven inland flooding), road elevation to adjacent ground (which can be an indicator of the potential impact of storm surge), etc. For more, see the Vulnerability Assessment Scoring Tool, referenced at the end of this document.

- (2) Consider entry points into the asset management process to incorporate and monitor these potential risks; and
- (3) Demonstrate how risk mitigation activities may influence life cycle planning of assets; and
- (4) Develop life cycle plans for assets impacted with the objective of minimizing the whole life cost while preserving or improving the condition of the assets and performance of the system; and
- (5) Document any processes developed to help with transferring lessons learned.

Examples of relevant pilot project activities may include:

- Developing methodologies for using the results of a completed vulnerability assessment to develop a risk register that informs strategies to address identified risks.
- Applying methods to identify and prioritize risks, assess options to mitigate risks, and develop a risk management plan.⁴
- Development of life cycle planning for asset classes that addresses costs of implementing adaptation options to address the risks for transportation asset management plan development.
- Integrating the impacts of extreme weather and climate on pavement and bridges into the pavement management and bridge management systems considering intervention thresholds or durability. Applying bridge and hydrologic analysis to cross culverts that carry streams and/or drainage. Then considering the potential system performance (e.g., mobility) impacts of extreme weather and climate risks to cross culverts and/or drainage systems, and addressing those risks in their asset management practices.
- Identification of proxy indicators that can assist transportation agencies in assessing asset vulnerability before a more in depth engineering analysis is done. For example, low lying areas with a documented history of flooding problems are more likely to be vulnerable to projected increases in precipitation. These proxy indicators could then be added to the Vulnerability Assessment Scoring Tool (VAST).⁵

Process and Timeline

The process below will be followed in the application, review, and award process for the pilot program:

| Activity | Date |
|---|---------------------|
| 1. Call for pilots released | Week of May 1, 2017 |
| 2. Informational Webinars for interested applicants | May 15 & 22, 2017 |
| 3. Completed proposals from applicants due to respective FHWA Division Office . | June 30, 2017 |
| 4. Division Office reviews, sends with endorsement/comments to FHWA headquarters. | July 10, 2017 |

⁴ See FHWA's [Risk-Based Transportation Asset Management Reports 1-5](#).

⁵ [DOT's VAST Tool](#)

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| 5. FHWA headquarters panel reviews proposals with respect to the selection criteria. FHWA announces selected pilot projects. | July 28, 2017 |
| 6. FHWA headquarters transfers funds to Division Office for distribution to selected pilots. | August 4, 2017 |
| 7. Pilot project draft reports due. | September 8, 2018 |
| 8. FHWA sends comments to pilots. | September 25, 2018 |
| 9. Pilot project final reports due. | October 12, 2018 |

Submitting a proposal is not a guarantee of funding. Pilots will be selected based on the criteria in the relevant sections below.

Required Pilot Project Activities

The pilot projects have three required activities:

- Participation in a Kickoff Call
- Completion of the Pilot Project Report
- Participation in Peer Exchanges and Webinars

These are described below.

Kickoff Call

After selection, the recipient will participate in a conference call with FHWA to discuss the pilot project work plan and timeline. Recipients will keep the FHWA Division Office and headquarters program office up to date on the status of the pilot project throughout the project.

Pilot Project Report

Each recipient will develop a report that documents the methods and strategies the State DOT implemented to identify and address extreme weather and climate risks in asset management processes and plan development. The report will also address extreme weather and climate risks in life cycle planning; and, more generally, promote communication between asset managers, engineers, planners and environmental staff who focus on extreme weather and climate change at the State level. The report will also document any challenges and solutions encountered that could be instructive to other transportation agencies. Finally, the report will document identification and use of indicators for vulnerability used for the pilot study.

Required elements:

1. **Executive summary:** Summary of pilot purpose, context, asset management practices, asset vulnerabilities to extreme weather and climate change, methods used in the pilot, results, next steps, and lessons learned. 2 to 4 pages total.
2. **Introduction:** Brief summary of pilot purpose and the reason(s) for conducting this work.

3. **Background of Prior Work:** Summary of understanding of asset vulnerabilities to extreme weather and climate change, existing asset management practices, asset life cycle planning and integration of risk with asset management.
4. **Context of Pilot:** Detailed description of the purpose of the pilot and how this work will add value to transportation efforts in reducing asset risk to extreme weather and climate vulnerabilities, and managing assets more efficiently over their whole life while minimizing the cost to the extent practical.
5. **Methods:** Technical approach analysis methods by systematic approach (e.g., subsections of: identifying asset vulnerabilities and filling in data gaps (largely relying on past effort); developing or enhancing existing risk registries; integrating findings into the asset management program; potential for leveraging management systems).
6. **Results:** Detailed description of the results, including identification of any gaps or needs, benefits of the pilot to the transportation agency, challenges and solutions encountered during the pilot project.
7. **Next steps:** Additional action the agency intends to take or is considering taking regarding the options analyzed
8. **Technical appendices (optional):** Additional documentation or detail should be placed in technical appendices. The report (not including appendices) should be no longer than 50 pages.

FHWA will provide feedback on the draft report and the recipient will finalize the report, taking into consideration FHWA feedback to the extent feasible.

The pilot reports must contain scientifically sound analysis, comply with FHWA standards for research reports⁶, and be submitted on-time in both 508-compliant Microsoft Word format and 508-compliant pdf format. For more detail regarding 508-compliance and potential additional requirements to be provided by FHWA at the kickoff meeting, review the report: [FHWA's Guidelines for Preparing Technical Reports](#).⁷

Peer Exchanges and Webinars

The selected pilots will participate in peer exchanges among pilot agencies designed to inform the development of the guidebook as well as provide valuable information sharing opportunities among attendees. Other participants in the peer exchanges may include asset management experts, engineers, climate scientists, and representatives of Federal, State, and local agencies. The peer exchanges will be one day in length. At least one representative of the pilot must attend each of the two peer exchanges.

⁶ For instance, reports must be suitable for posting to FHWA's website, cannot contain contractor logos, and must include a Technical Report Documentation page. Figures, tables, and images must include descriptive tags for 508 compliance.

⁷ Specifically, reports must be submitted in Microsoft Word to facilitate posting in html to FHWA's website, cannot contain contractor logos, and must include a Technical Report Documentation page. Figures, tables, and images must include descriptive tags in order to comply with accessibility requirements (Section 508 compliance).

In addition, the FHWA will arrange periodic webinars among the pilot agencies and key stakeholders that will help create a network of peers focused around their pilot projects and provide a venue for exchanging lessons learned. At least one representative of the pilot should participate in each webinar.

Eligibility

The funding recipient must be a State DOT (as defined above). Eligible projects are those that integrate extreme weather and climate risks into asset management. Proposed projects will vary in complexity depending on the extent to which the state DOT already has identified and prioritized extreme weather and climate risks, and the status of their asset management plan development process.

It is anticipated that 4 to 6 pilots will be selected and will be co-funded by the selectee and FHWA. It is anticipated that the FHWA share of the pilot projects will be approximately \$50,000 to \$150,000 each, with a matching requirement of at least a 20% non-federal share, and a 50% non-federal share is preferred. In-kind contributions may count as match.

Informational Webinars for Potential Applicants

FHWA will hold two webinars to provide an overview of the pilot program and answer any questions. The webinars will cover the same content but are offered on two different days to accommodate different schedules. Registration is required, but it is free and can be completed up to the day of the event. The webinars are scheduled for:

- Monday, May 15th from 1-2 pm
- Monday, May 22nd from 2-3 pm Eastern

Registration is available at: http://www.fhwa.dot.gov/environment/climate_change/adaptation/webinars/.

Required Contents for Proposals

The pilot proposal must be no longer than ten pages using 12 point font (not including letters of support and appendices) and must include the following elements:

1. **Description of the Proposed Effort.** This section should include the purpose/goal and a detailed description of the effort to be funded. It should also include a description of any ongoing efforts/strategies to include risk from extreme weather and climate in asset management, including: applying the results of vulnerability assessments in asset management, development of relevant proxy indicators, or use of asset management systems for this work.
2. **Description of Dedicated Staffing/Resources.** Agencies should ensure that adequate funding, staffing and technical resources to successfully complete the pilot are identified and available. This section should fully describe the resources that will be dedicated to the pilot, and demonstrate how the non-Federal match requirement will be met. This section should describe how the proposed effort fits within other climate change, extreme weather and asset management on-going efforts, if applicable.
3. **Draft Work Plan.** Applicants should provide a draft work plan to inform the selection process, which should explain how the applicant plans to conduct the work. This would include the phases of work, budget, their sequencing, work products, and timing. If contractor assistance is planned to support the effort, that support and estimated level of effort should be included. The budget should include

sufficient resources to carry out the analysis, develop the final report, and travel to participate in two peer exchanges. The budget should indicate the level of funding requested, the amount of the funding match, and any other sources of funding. This section should also indicate how the project can be performed before the deadline noted above so that the results can feed into the development of the guidebook.

4. **Letters of Support from Partners, Stakeholders.** While a State DOT must be the lead agency for the effort, we encourage partnerships and collaboration with MPOs, other transportation asset owners, and other government agencies, among others. This section should include any letters of support from other agencies, partners or stakeholders critical to the success of the pilot project.

Criteria for Selection

The criteria below will be used for selection.

1. Project is application-oriented, not theoretical research.
2. Project addresses transportation assets that are vulnerable to extreme weather and climate impacts at the network level. The proposed analysis would develop entry points for integrating extreme weather and climate into asset management practices that would lead to enhanced performance and inform smart investment decisions. Bonus points if analysis: has clear applicability to other State DOTs, builds upon a completed transportation vulnerability assessment, has operational asset management practices, uses a GIS-based analysis, and/or considers communication practices amongst asset managers, engineers, environmental staff and planners.
3. Well thought out project plan and technical approach. Ability to complete project within required timeframe.
4. Willingness to contribute to and improve the guidebook and provide case studies and lessons learned to share with others.
5. Demonstrated funding/staff resources.
6. At least a 20% non-Federal share demonstrated. Higher matches will be viewed favorably in the selection process (50% match is preferred).
7. Demonstrates collaborative approaches and partnerships.

Resources

Applicants may wish to consult the following resources in developing project descriptions.

- [FHWA asset management site](#) – Provides links to FHWA asset management policies, guidance, reports, and projects.
- [FHWA Resilience Webpage](#) – Provides links to FHWA resiliency guidance, reports, research, tools and pilot projects.
- [FHWA's Virtual Framework for Vulnerability Assessment](#) - Provides resources, tools, and guidance to help local and regional transportation agencies implement FHWA's [Climate Change and Extreme Weather Vulnerability Assessment Framework](#), a guide to assessing the vulnerability of transportation assets to climate change and extreme weather events.
- [FHWA Climate Resilience Pilots](#) - In two groups of pilot projects, FHWA partnered with State DOTs and MPOs to conduct climate change and extreme weather vulnerability assessments of transportation infrastructure and to analyze options for adapting and improving resiliency.

- [Vulnerability Assessment Scoring Tool \(VAST\)](#) - Provides a framework for conducting a quantitative, indicator-based vulnerability screen for vulnerability based on use of vulnerability indicators for each asset.
- [Sensitivity Matrix](#) - Provides information on the sensitivity of different asset types to a range of stressors.
- [Transportation Engineering Approaches to Climate Resilience \(TEACR\)](#) - Includes project level adaptation case studies; and, a summary of lessons learned and information to support engineering informed scoping studies, with information organized by discipline that is expected this summer.
- Two Hydraulic Engineering Circulars:
 - [Highways in the River Environment – Floodplains, Extreme Events, Risk, and Resilience \(HEC-17\)](#) - Provides technical guidance and methods for assessing the vulnerability of transportation facilities to extreme events and climate change in riverine environments.
 - [Highways in the Coastal Environment \(HEC-25\)](#) – Provides technical guidance and methods for assessing the vulnerability of coastal transportation facilities to extreme events and climate change.
- [U.S. DOT Gulf Coast Study \(Phases 1,2\)](#) - The U.S. DOT Gulf Coast Study produced tools and lessons learned that transportation agencies across the country are using to assess vulnerabilities and build resilience to climate change.
- [North Atlantic Coast Comprehensive Study](#) - The U.S. Army Corps of Engineers recently completed a report detailing the results of a two-year study to address coastal storm and flood risk to vulnerable populations, property, ecosystems, and infrastructure affected by Hurricane Sandy in the United States' North Atlantic region.
- [National Climate Assessment](#) – Summarizes the impacts of climate change on the United States now and into the future.